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ZOOLOGICAL AIMS AND OPPORTUNITIES

IT is hardly necessary to remind you that the stress of recent months has not been very favorable for the production of an address worthy of this occasion. I shall present no apologies or excuses for the shortcomings of my effort but it may be fair to state that the subject selected has been determined in part by the conditions of world turmoil through which we have been passing and the thoughts almost inevitably prompted by the rapidly shifting viewpoints in almost every phase of human thought.

Since we are human beings as well as zoologists it is natural that we should be confronted with questions as to the status of our science in the world problems of the day; the effects that may follow the immensely critical movements in human adjustments and, perhaps above all as to the bearing of our zoological knowledge, philosophy and instruction upon the shaping of human activities and human progress.

To merely state these questions would involve more time and a more comprehensive grasp of human affairs than I can claim; to attempt answers to them would involve prophetic vision as well as broad knowledge, but nevertheless I shall venture to present a few, perhaps disjointed, suggestions, believing them to be of imperative importance and in the hope that they may stimulate further interest and discussion.

It will help to form a basis for these suggestions to consider for a moment the method by which the science of zoology has developed and reached its present status. As with other sciences and human knowledge in general it

[1] Address of the retiring vice-president and chairman, Section F, Zoology, of the American Association for the Advancement of Science, Baltimore, December 27, 1918.

has been a matter of very irregular growth, now one phase, now another forging ahead; the mistakes of one generation being corrected by a later one and the faulty interpretations of limited knowledge clarified with wider basis of fact. Often the progress of one branch has been definitely halted till the developments in other fields have given the data necessary for a clear comprehension and satisfactory solution of its problems.

The rapid advance of one phase may have resulted from individual taste or interest or again from some insistent demand from an associated or dependent field. Comparative anatomy has been pushed forward by the needs of human anatomy; in fact many phases of zoology particularly related to medicine have had their progress determined by the needs of this applied science. The medical importance of certain mosquitoes and flies has stimulated tremendously the interest in these groups and the amount of study devoted to them.

Extremely destructive insects, from a human standpoint, have been investigated with far greater assiduity than is true of most of the species devoid of economic interest. Attractive habits or a human interest perhaps accounts for the fact that birds have been much more studied and are far better known than the worms on which they feed, and that ants, bees and wasps with social habits have claimed attention to the neglect of less highly specialized forms.

Primitive observations of the character and habits of animals, stimulated no doubt by the needs for food and the domestication of available forms, has grown into definite knowledge concerning the habits and life histories and other general matter. The study of animal activities must have been closely coincident with that of the animal mechanism and these gradually differentiated into the now almost too widely separated branches of morphology and physiology, while passing further into the realm of the interactions with surrounding forces or interrelations with other organisms has developed into the ecology of modern times. Recognition of the succession of generations of like animals laid the foundations for a knowledge of the main facts of heredity and these with later knowledge of the mechanism of inheritance gives us our modern conceptions of genetics.

Attempts to designate the various animals must have developed by slow degrees into the primitive recognition of species and quite naturally into the further association of groups of similar kinds such as birds, fishes, reptiles, etc., which were undoubtedly the beginnings of our systems of classification; systems whose complexities now sometimes become the despair of the initiated as well as of the amateur.

Comparison of the animals of different geographical regions involving the recognition of distribution, of adaptations to climate, topography and other natural features and to restriction of modes of life must have early entered into the realm of zoology. Curiosity as to the meaning of fossils grew with our sister science of geology into modern paleontology with all its significant contributions to the interpretation of life and its historic development.

Speculation as to the origin of animal life certainly came at an early date and the long tangle of conceptions of the processes of evolution which have culminated in our doctrine of descent was started on its devious path.

But it is not my purpose to trace in detail the growth of the different branches of zoological science. What I would like to emphasize just now is that we have a large number of quite distinct phases of our study and that these have become so specialized that the workers in one branch may have very little conception of the nature of the problems, the technique or the difficulties attending the advancement of knowledge in another branch.

In some cases this seems to have resulted in lack of sympathy or in misunderstandings that have served as a handicap to the progress of the science as a whole and a mutual recognition of the interdependence of all branches should be helpful in determining future progress. The truth is that there is no branch of zoology overworked or exhausted and there is

every reason for cordial recognition of the work being done in other fields than one's own specialty. Moreover, so dependent is one branch for its fullest development on the progress of related or supporting branches that any other attitude is to be deplored.

In a general way and for the purpose of my discussion we may separate zoological activities into two broad classes (1st) investigation, research or the accumulation of new knowledge and (2d) instruction or the distribution of this knowledge to the public at large.

In many ways the aims and methods of the two may differ and yet there is imperative need of the closest and most sympathetic contact between the two and among the workers in the different spheres. In many cases—and I believe most fortunately—the two functions are combined, but often such separation exists as to result in loss of effort or even conflict of action.

ZOOLOGICAL RESEARCH

It should go without saying that research must precede instruction at least as applied to any particular object although it would seem that this order is at times reversed.

We may sometimes discover quite munificent provision for education in a too narrow sense with little apparent recognition that the subjects covered are still little known or crudely assembled. Extended and careful investigation should be the first effort in order that accurate and useful knowledge may be available for instruction. Here too will arise the question as to the kind of research that should be given first and most insistent attention.

The point of view may be determined largely by the concept or ideal as to the ultimate goal of zoological effort. Have we a definite object or are we still, as in the early stages of our science, simply following attractive leads or the easiest trails to see whither they may carry us? Is it our greatest ambition to produce a zoological structure complete and perfect in itself as a scientific ideal or to give earliest and most effective service possible to all the agencies operating for human progress and human welfare? Shall our immediate efforts be given to questions of most remote concern to present problems of life or shall we concentrate effort on those phases which by their relation to medicine or to industry have vital bearing on immediate human needs? Such questions must have come to many of us when searching our innermost thoughts for evidence as to what we could do to help "win the war." Such questions may well concern us in the history-making period that must now follow in the establishment of order and a new alignment of human relationships and activities and which must necessarily be of world-wide scope.

Perhaps we may reflect that these questions will be largely settled by the tastes and choice of the many individuals concerned and that the outcome will be a fairly well-balanced combination. Nevertheless it is evident that the question will come as an urgent one to many individuals and will affect their attitude both in research and instruction so that some sort of decision as to the direction of greatest emphasis will need to be made.

Admitting, however, that the final goal is economic advantage, the development of applied science for the betterment of human society, we may still inquire as to the route to the main objective. I would certainly be one of the first to accord a high place to all phases of science that have made and are making for human advancement. Human society is not only our greatest achievement so far but it offers the only basis we know for evolution and progress in conditions of world affairs that should make this earth the fittest place possible for human life.

But we must guard against a too narrow view of the values in scientific knowledge. That which is of the most immediate concern may be but temporary in its application and some of the most vital and enduring things may be less apparent.

It is fortunate therefore that along with the many agencies that are attacking the immediate problems of applied science we have numerous agencies interested in the explora-

tion and investigation of fields whose immediate contribution to human welfare may be difficult to discern. It is a well-known fact that many of our most important advances in applied zoology have been possible only with the basis of knowledge acquired in some field that seemed quite unrelated to human affairs. Instances will occur to all but such stock examples as the ecological relations of trichina, liver fluke and other parasites may serve to emphasize the point.

It may be suggested then that one of the great objectives for the immediate future is carrying forward our researches on all fronts, that we may secure cooperation and correlation in the various lines and that we aim at a more complete and perfect combination of fundamental knowledge, which may be accessible from all sides for the furtherance of such applications as may be needful in human progress.

Whatever our objective, it is interesting to inquire as to our conditions for progress, the lines of work that we may see most clearly ahead of us, the agencies through which we may press for their attainment and the helps or handicaps that are to be reckoned with in our efforts.

I feel sure no one will question the need of continuous effort in the line of structure both general and histological or of function and activities in the widest sense for tissues, organs and individuals. These constitute such an imperative basis for all work in embryology, life-history, activities and relationships that only the most superficial view would permit of a lessening of effort in these lines.

As we go further in economic lines we appreciate more and more that the control of organic nature for the advantage of man must be based on the most complete knowledge of the structures, functions, habits, responses and relationships of the organisms with which we must deal. Can we say of any animal that we know all about it, that needs to be taken into account, when we attempt to fix its place in nature or with reference to the organisms with which it may be associated?

Have we by any means exhaused the problems of structure, the physical factors in animal symmetry or correlation of organs or of the activities of animals in many phases. What of the mechanics of flight or aerial locomotion as exhibited in various groups? How do certain insects hover or fly backward, as in many different families or even fly upside down as is claimed for certain tabanids. And once these questions are satisfactorily answered there will still arise the question as to how such complicated activities had their origin, what were the structural bases on which they were built and what the forces that have operated in their evolution. Even the ultimate problem as to the nature of life itself must be solved, if ever, on the basis of those organic forces which though possibly only combinations of simpler chemical or physical forces are so indissolubly linked with organic structure that this must be our base of attack.

To enter another field and one of recent important strides, consider the wealth of unsolved problems concerning the relations of animals to their environment and to each other. These present, especially for the biological factors, some wonderfully intricate associations and the determinations except for a given time and place, perhaps, an impossible task, since the various elements are in constant process of change. But many of the more constant factors may be determined with approximate accuracy and allowing for periodic variations may afford a basis for some valuable deductions, even possibly, for useful economic practises. To cite a particular instance let me mention the study of the short-tailed shrew by Shull. Here is a species seldom attracting attention but widely dispersed, occurring in great abundance and with a variety of food that includes a large number of species that we consider very injurious along with many that are innocuous or possibly even beneficial. Doubtless we would find a different bill of fare for the species for every month of the year and possibly for every field in which we might study it, but the total appears to be decidedly in the animals favor.

The relation of birds in agriculture has been a most debated and debatable question and largely because of the inconstancy in food habits of many of the most familiar species. Considered strictly from an economic point of view there is little doubt that the status of many species is still open to investigation. So too the place of spiders in the ecologic association is one of much complexity along with that of a host of predaceous and parasitic forms. A phase of their relationship that seems however to be often overlooked is that except for the abundance of the species on which they subsist their presence in any given association could be dispensed with. Since they are dependent on forms that again are dependent on vegetation it is obvious on second thought that all such forms are indirectly a drain upon the plant element and, speaking agriculturally, might best be wanting if the host forms were absent.

I need not weary you with further examples but submit that here is a field of work of intense interest biologically, offering an infinite number of fascinating problems, calling for the finest ability in field observation and laboratory analysis and promising results of decided importance for economic applications in agriculture, forestry, fisheries and many other fields.

These animal associations lead quite naturally to the conditions shown among social species and these social organizations among various groups of animals, as also the psychology of the lower animals, offer much that is suggestive for the sociologist and psychologist and certainly there should be some point of contact for students in these various fields. It is only upon such broad biological foundation that we can build a rational sociology or philosophy both for zoology and for human life.

Certainly one of the great aims in our science is to discover as rapidly as possible all the forms of life that inhabit the earth and, I may add, all those for which we can gain evidence of existence in the geological ages of the past. Only with this knowledge in hand can future students expect to reach the most conclusive knowledge as to the inter-relations and interactions of the organic world or the derivation, affinities and possible relation to human interests.

Zoological exploration has been a favorite activity in all the periods of zoological study. I see no possibility that its interest can lag so long as there are unexplored fragments of the earth's surface or the waters or the air surrounding it or unknown forms of life to be uncovered. Indeed with the greater facilities possible in modern transportation and communication we may expect a great impulse for this kind of work. "Impenetrable jungle" and "inaccessible" mountain peak may be brought within easy access of the modern airship while continuous means of wireless communication will greatly favor such enterprises. No doubt our zoological explorers will take advantage of these means and add tremendously to their contributions to science, and, probably, to the world's sources of wealth, convenience or enjoyment.

And what of our taxonomy? Will future generations be content to endure some of the enormities perpetrated under our system of nomenclature? Names we must have and recognition of specific, generic and other natural groups of organisms, so also uniformity and stability for the world of science, but I certainly have deep sympathy for the morphologists, physiologists, cytologists and other workers who must perforce use some name to designate the material on which their work is based and who find a most chaotic assemblage of names from which to select. Of course systematists are not alone in such troubles, as the terminologies of morphology, cytology, etc., appear to have some uncertainties of their own.

It is to be hoped that the efforts of the international commission may be supported and their work now pushed forward with renewed zeal. With closer and more universal relationship between workers in all countries it becomes more and more essential that we have a recognized and established system for all languages and all groups of animals. Especially important is the fixing of such names as are most generally used in research

and education, as here is where the burden falls most heavily on the workers who are not systematists. No taxonomist should have the heart and if possible should not have the power or the opportunity by shifting a genus or rearranging species to foist upon a patient world the necessity of adopting a new combination in the name of the common species universally referred to in anatomy, medicine, agriculture or other lines of applied science.

I have elsewhere hinted at the discouraging nature of these nomenclatural acrobatics to the student entering on zoological work. I have good reason to believe that many promising and brilliant young workers have been disgusted and drawn to other fields of effort because of the complexities and apparently senseless chaos involved in the synonymy of many of our common animals. Think of thirty-six different specific combinations for the oyster-shell scale (that is 36 the last time I had occasion to note the number) or twenty-six for the screw worm fly.

Particularly aggravating are such cases as the mosquito, cattle-tick and other forms related to disease and necessarily used by medical students. Clearly one of the most helpful things in zoological education would be a condition of stability in nomenclature which would permit us to assure our prospective zoologists of the coming generation that they would not have to learn and unlearn a succession of scientific names for the things with which they deal.

Some cases would be amusing if they were not so tragically wasteful in valuable time. I recall a student of cytology who was greatly puzzled because the chromosomes of two supposedly distinct species under different generic names were exactly the same, and whose relief may be imagined when he learned that they were one species identified from different collections under names of different vintage. He might well have been disgusted as well as relieved.

It is rather dangerous to suggest remedies or reform in this line but I venture to offer one, which is that systematists curb their desire to form new genera and limit these so far as possible to new species or use special care not to shift into a new genus any of the common species whose names have been for a long time in general use. The concept of genus is an indefinite one; more than the species it may be subject to wide individual interpretation, but to multiply generic names and so necessitate the renaming of a great number of common well-known species is a most lamentable affair. To do it without most essential taxonomic needs is indefensible. To do it because some other group has a greater ratio of genera to species, as recently advocated by a well-known authority in a certain group, seems to imply a total disregard of the real needs and purposes of a nomenclatorial system.

ZOOLOGICAL PHILOSOPHY

The great problems of human society, racial, sexual, industrial, commercial, have their basic foundations in conditions that are fundamentally zoological—that is, dependent upon the animal nature of man and having their roots far back in the soil of animal life of which man is a part, even if he is the most recent and dominant of the process of evolution.

Whether we will or not, we must recognize these inherited conditions and capacities of our species and may well consider in what regard the fundamental laws of evolution apply to present-day problems of human development. Shall we still adhere to the idea of brute force as the determining factor in the survival of the fittest or shall we adjust our vision to the conception of ideas of justice, morality, love for the beautiful and of ethical standards as the highest and most advanced product of that great force of evolution which we, as zoologists, most confidently accept as the method of the universe? Shall we do our utmost to preserve and develop these latest, finest, most attractive products of evolution or permit them to degenerate like vestiges of unused organs?

Possibly I may have been alone, but I suspect that many of my zoological friends have found the past few months a time of soul-

searching questioning and review of our accepted beliefs in organic evolution, to discover if possible whether there is any warrant for the claim that they can be made to support and justify, even in distorted form, such unspeakably inhuman activities as have followed in the wake of the attempt to establish domination for a self-styled superior race. Of course we may now interpret the result if we choose as establishing the place of the triumphant side in the contest, but I do not think we need stop to argue concerning the "fittest" in this "struggle for existence." There is too much to be done, too many vital issues at stake for human progress in the immediate future and all our resources in thought and action will be demanded in their solution. But, granting all this, must we not face the cold fact that our basic principle in organic evolution is capable of misinterpretation or misapplication when it is in any way possible for it to be invoked as the justification for starting such a train of misery and death to the nations of the whole world? It takes remarkable optimism concerning the betterment of mankind as the results of this war (and unquestionably betterment may come in many regards) in order to feel that the evolution of our human family to higher conceptions of order and cooperation in national affairs could not have been achieved without the tremendous, monstrous cost of such a war.

Ought we not in all fairness to a biological principle which we believe to have been the basis of all our achievements in morality, altruism and ethical standards of human society to see if possible that its basic principles, its proper interpretations and its proper results are so impressed upon our biological thought and policies of education that zoology as a science can never again be charged with such infamous doctrine as a support for the divine right of kings or the origin of a world war such as has agonized the nations of the present day.

The growth and progress of science itself has so much at stake that, even with a narrow selfish interest in the advancement of our special branch of study, we can not be indifferent, but as part of a greater educational world and a still greater world of human activity we owe it to ourselves and our science that our principles be not only well established, but that they are correctly interpreted to the world at large. We have here not only a great aim but a great and most significant opportunity. If our statesmen can be brought to think and act on the basis of a most enlightened biological interpretation of the world and human society, I believe we need have little fear for the safety of future generations.

AGENCIES FOR RESEARCH

In organized agencies or zoological research we certainly have reason to be proud and to feel that we have the basis for extensive enterprises and rapid development. The governmental bureaus of Biological Survey, Fisheries, Animal Industry and Entomology, which have been contributing very largely to the growth of zoological science in recent years, are facing new opportunities and will have had their activities stimulated by recent events. While they have no doubt been handicapped by the temporary or permanent loss of many of their workers it is certainly to be expected that they will resume their work with renewed zeal and efficiency.

In the universities, colleges and experiment stations where there has been perhaps the heaviest drain on the younger workers, who naturally form a very large per cent. of the active force, there should be prompt resumption of activity and researches along many lines that have been suggested by problems faced during the war, which will offer unlimited opportunity for ingenuity and original investigation. So to the museums, state academies, surveys and all the institutions interested in exploration or research will spring to renewed activity.

In view of the many agencies of this kind and the large support given to zoological research it is fair to ask whether we are getting the utmost in return and whether there are any tendencies in these organizations inimical to the most effective results? It is perhaps hardly to be expected that we have an ideal

condition of ample support for research with untrammeled freedom both in subject and method of work. It does seem fair to expect and demand that the necessary administrative restrictions, committee approvals, financial safeguards, and all the other factors of delay and annoyance to the investigator should be reduced to the lowest possible minimum.

EDUCATIONAL ASPECTS

To the thoughtful student of zoology and especially, I think, to the teacher who reflects upon the relation of his subject to the development of scholarship and character, or its relationship to the general welfare and advancement of human society, a question that now looms large on his horizon is whether we are using this material and effort in the way to secure the greatest benefit.

Our systems of instruction have been developed largely with the traditional methods for other subjects in mind, or often with the necessity of adapting work to schedules or methods in vogue in other quite different fields of knowledge. Even didactic methods have been more or less forced by influences quite out of harmony with biological spirit and needs.

That these have been unsatisfactory in many ways has been attested by many efforts to break away from the conventional plans, but possibly most conspicuously by the establishment of the many summer schools, field stations, or laboratories where biologists may handle instruction on plans adapted to the material and to the conditions under which life exists and under which it should be studied.

Unfortunately, this method has been developed mainly with reference to mature individuals and, while the service rendered through teachers with such experience and training may be of great value, it would seem entirely unnecessary to argue for such a plan to be applied to beginners as well. Indeed, many of the summer camps for boys and girls, the activities of the boy scouts movement and courses now offered in some schools give evidence of attempting such methods, but if of advantage for the few why not for the many and why should not the essentials of such method be utilized to the greatest possible extent for all pupils who enter on the study of living things, and which as living things, should be studied under the conditions which recognize the life factor!

Perhaps, to state my view in brief, I would say that the first instruction in zoology should be training in observation. The natural curiosity of the pupil concerning the living things about him should be stimulated and gratified, not smothered by the cold reception of unsympathetic teachers. If connected with the practical biological problems of his daily life I believe it will be all the more effective.

If the subject is taken in the high school it may advance to some of the most obvious facts and principles of biology, but it seems to me this period should be concerned much more with recognition of facts and giving acquaintance with living things, than with attempts at the more profound generalizations. If the student has his interest stimulated and carries his study further, this foundation will be far more valuable than a drill upon speculations the nature of which is beyond the comprehension of the immature mind. If he never gets beyond this stage it will serve him far better for the problems of life than hazy notions of zoological theory.

A somewhat similar view applies to the general or introductory course in zoology for the college, which should be planned for the great body of students who take the subject as a part (and, I believe, a most essential part) of their general education, not for the very small percentage who may later become professional zoologists. That is, the first demarkation should come after the more fundamental basis has been laid for the good of the specialist as well as for the sake of the majority whose school work in the subject stops with the one course.

Obviously the content of the course and the method of treatment should be adapted to the maturer minds and may deal with significances and interpretations as well as facts, but in a broad way should follow the same

principle of personal contact with the material on which the instruction is based.

Just now the content of the first college course and the time allotted to it seems to me to be of very grave concern, as many influences are operating to change its status.

To ignore or minimize these is to endanger the position already secured after many years of effort and to me this is to endanger the whole fabric of our educational system, as I deem the biological point of view and mode of attack of the greatest concern to a properly balanced and rounded education.

The great increase of subjects offered in our elective systems of education; the constant effort of the devotees of each branch to secure more and more time with minuter subdivisions of subjects or greater numbers of students, results in the practical elimination of certain subjects from the curriculum for many individual students. The demand of special, technical or professional schools for certain phases of the subject, or its limitation to very meager time, threatens to reduce the time and scope of work with serious disadvantage to both teacher and student. The call for special courses is highly encouraging as an evidence of the place zoology has come to occupy in these fields, still the supposed wants of medical, dental, sociological and agricultural students puts a serious strain upon the teacher who feels that there are certain fundamental things that are essential to proper handling of any subject resting upon biological foundations.

Moreover, under the stress of national emergency, we have been straining to give intensive or specialized courses containing the greatest amount of essential matter, especially economic, in the shortest possible time. Whether we will or no, there is likely to come the view either to the student or the administrator of student curricula, that if such intensive courses are effective in an emergency they might well be useful at other times, In any case we may be obliged to face the alternative of giving what seems zoologically most necessary in briefer courses, or seeing many of the students who ought normally to get the training it affords disappear from our laboratories.[2]

I feel very certain, however, that whatever may be necessary in the way of concentration or reduction of time, we must insist on a proper balance of the various fundamentals in our subect, a proper combination of morphology, physiology, ontogeny, ecology, genetics, distribution, evolution, taxonomy and the basic principles of economic practise, as essential to a proper perspective and to any recognition of the proportion and values, the omission of any one of which will result in imperfect views.

To borrow a simile from the field of animal nutrition we must have a balanced ration to ensure symmetry of growth and completeness of development and I can not approve efforts to give introductory courses based on any one of these elements to the exclusion of others no matter how fundamental and necessary they may be to the structure as a whole.

In the same way I can not endorse selection on the base of any one group of animals. While it is true that practically all biological principles may be illustrated within the confines of a single class of animals such limitation must necessarily result in a narrower conception of the animal kingdom as a whole.

I confidently believe that almost every phase of life can be found among the insects and, as a specialist in Hemiptera, I have often had occasion to remark that this one group of insects can easily be made to exhibit the greatest variety of biological principles. The same no doubt can be claimed by the specialist in almost any general group. But to make such a selection in our elementary training courses

[2] I note in a recent number of SCIENCE (November 22, 1918) in an article by Professor Bradley M. Davis on "Botany after the War" that the same questions concerning instruction in botany are confronting our brothers in biology and it is very evident that much may be said in one branch which will apply with equal force in the other. The important point for us is to decide whether we shall rise to meet the new vision and either justify and defend our present standards or adapt them to coming needs that may require new alignments.

would, it seems to me, defeat many of the most important objects of our college work.

There may well be differences of opinion as to the sequence and proportion of the different phases of zoology to be contained in the introductory course. I grant too that some latitude may be allowed for the preferences and training of the individual instructor but, conceding this, it seems to me that there are certain fundamentals that should be provided for at some period or in some form in any course that claims to give the student the basis either for further work in zoology or for the general problems of life or their applications in agriculture, medicine or commerce.

Morphology must certainly stand as one, if not the first, of these fundamental points, not only because it forms the essential basis for all taxonomic, biologic, faunistic or other work but because it is *par excellence* the part of zoology which once learned is a permanent foundation for the shifting structures of biologic interpretation. Whatever speculations may follow as to significance, function, origin, etc., the organs and their parts remain a basic fact practically unchanged from generation to generation and the final resort in all controversy in biological interpretation.

Just how much laboratory dissection or anatomic demonstration is absolutely necessary may be open to debate but as to its essential character I think we must all agree. Next and closely associated with morphology I place physiology, because the activities of animals are certainly of vital consequence in all developments of biological knowledge. Moreover, it is only on the basis of their functions that animal structures can be properly understood. I sometimes feel that it is regrettable that physiology and anatomy should have been so widely separated in more advanced courses, although this is in some degree an inevitable result of specialization. But certainly for elementary courses such separation is indefensible.

The extent and character of the physiological element, however, is subject to wide variation with different instructors and a proper balance may be hard to determine. From the nature of the case it is impossible to carry this phase into the many debatable fields of physiologic interpretation and I believe the best results will be secured by centering attention on those functions most easily associated with the structures studied. The well-established facts of digestion, circulation, respiration, excretion, nervous activities and reproduction can best be presented in connection with the study of the organs involved and if these are taken up in a comparative series of the major groups of animals, the nature of these fundamental activities should be firmly fixed in the mind of the student. Reproduction especially, with the associated phenomena of growth, metamorphosis, inheritance, etc., can most profitably come in as parts of a progressive system leading from lower to higher forms not only to show the gradual evolution of the system but as a most natural and desirable introduction for the presentation of sexual hygiene so vitally important for the happiness of the individual and to the perpetuity and progress of the race.

Ecology for the introductory course should be given large attention, but rather as a means of fixing the significance of structure and activity than as a separate field of study. So too the economic relationships may be profitably treated as associated with function and ecology.

The main facts of geographical distribution may have been suggested in the discussion of various animals, but discussion of migration and adaptation can hardly be omitted in a summary of biologic factors and with the foundation of a comparative study of the great groups of animals with indication of their historical development, the basic principles of the evolution of animals may be undertaken.

The amount of time accorded to classification is again a matter of great difference of opinion and practise. With the more special problems of taxonomy it is certainly unwise to deal in a class of general students. Puzzling and intricate problems of taxonomy should be presented to technical students in later courses and in much greater detail than would be

possible to a general class. But to omit the broad foundations of classification or to neglect its connection with its morphological basis is to lose one of the best mental disciplines and also to leave the student without that systematized grouping of facts with which he is dealing, that is so fundamentally essential to any clear grasp of correlations, or the orderly handling of facts that present themselves in the course of his life. I know of no discipline better, to give training in the systematic arrangement of matter than through the basic principles involved in the orderly arrangement of the myriad forms of animal life.

Above all of course we should have freedom of action for the individual teacher. The best in any teacher may be expected only when he can give his whole heart and enthusiasm to his work. I believe that it is possible with intelligent and sympathetic cooperation to secure both this freedom of action and a well-balanced and correlated agreement on the main content and aim of instruction and with this goes opportunity and responsibility which we need not attempt to measure.

I make no apology for introducing what may seem at first sight a rather primary and academic discussion in this line. We must all recognize that the ranks of our future zoological workers must be recruited in large part if not entirely from among the students of our high schools and colleges. It is certainly most vital to the progress of our science that we secure our share of the best talent represented among such students. It is of even greater consequence that the coming generation should have such fundamental training in the activities of life that they may be best qualified for citizenship.

I have purposely omitted any detailed discussion of the more advanced courses of zoological study offered in our college or university curricula, partly because I feel that there is the greater need of careful, constructive attention to our introductory courses, which should by all means have the advantage of the most able and experienced teachers, and partly because the drift and detail of the more specialized courses will be in considerable part a response to the changing demands of passing years. Our product of the advanced training should certainly provide us with qualified investigators and teachers in the many phases of zoological work. There is, however, I fear, a tendency to meet so many of these purposes that we are in danger of offering entirely too many special subjects as courses for undergraduate students. Zoology has perhaps not gone to the extreme of certain other departments of education, some of which appear to me entirely out of reason, but I find for instance in one of our well known schools no less than 57 different subjects offered as regular lecture or laboratory courses. Could not many of these more profitably stand as subjects for the individual student in seminary or graduate work or ought not the student with proper biological foundation to be able to follow them up independently after cutting loose from the leading strings of his academic instructors. Some of his time as an undergraduate ought certainly to be allotted to work that will give him the spirit and method of research, so that with separation from direct supervision he may meet the responsibilities and opportunities of adding to science with whatever talent and resource he may possess for original work.

EXTENSION ACTIVITIES

Within the last few years we have witnessed the organization of a plan of extension activities in education which is nation-wide in scope and the full significance of which, at least for zoology, I suspect we have failed to fully realize. The support available through the Smith-Lever act, while relating particularly to agriculture and home economics covers these in a broad way and, even in a rather close interpretation, must involve extension activities in biological lines, and zoologists will fail to meet their opportunities if they do not energetically occupy this field of endeavor.

That the field is pregnant with great possibilities may be surmised if we but review the

host of connections existing between zoological knowledge and agricultural practise. Not a single farm product but is affected directly or indirectly by some animal activity and the extent of unutilized zoology available is perhaps equalled only by the ignorance and indifference of a large part of the population most in need of accurate and intelligible information.

Some twenty years ago I took occasion to say in an address before the Association of Economic Entomologists that

> The problem or how to reach with the facts we have gathered the people for whom we work is one of the most difficult to solve. . . . No matter how carefully we experiment, how accurate and useful our results, we must place these results before a public uneducated in the details of our science.

The situation there referred to, though no doubt improved, is in some degree true to-day, but for a large part of the gain I believe we must credit the various extension agencies which have been developing in recent years.

Possibly some measure of this gain may be found in the enormous growth of the use of insecticides for the control of certain farm and orchard pests.

CONCLUSION

Finally then, in sum, I think we may say in confidence that zoology with its centuries of development stands as a great achievement of human thought and study; that it offers unlimited opportunity for further research and growth and that its aims and opportunities deserve the most ardent effort of its devotees.

Here at the most conspicuous milestone perhaps ever erected in the progress of the human race the passing generation of zoologists may hand on to the coming workers not only the product of generations of effort but the priceless opportunity of unsolved problems, the gift of possible achievements for many generations to come.

I appreciate that this is not a valedictory or an address to a graduating class and I beg pardon if I overstep the proprieties of the occasion, but the conditions of the day have impelled such appraisement of the situation and the occasional taking account of stock is perhaps at times a most necessary and profitable step in our undertakings.

I realize that there are many here present whose range of study and point of view must enable them to see with wider horizon and clearer vision the great domain, small tracts of which it is our individual function to cultivate, but I trust I may have your unanimous agrement to the sentiment that these various activities, so hurriedly sketched, so inadequately presented, are worthy of our most enthusiastic endeavor, our most loyal devotion and cooperation.

Herbert Osborn

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE AND SCIENTIFIC ORGANIZATION

The revised constitution of the American Association, presented at the Baltimore Meeting for adoption at the St. Louis Meeting, contains the following articles:

ARTICLE 6. DIVISIONS AND BRANCHES

Regional Divisions and Local Branches of the association may be formed by vote of the council. Such divisions and branches may elect officers, hold meetings, appoint committees, enter into relations with other societies, and promote within their fields the objects of the association.

ARTICLE 7. ASSOCIATED AND AFFILIATED SOCIETIES

National and local scientific societies may, by vote of the council, become associated with the association. Those associated societies which the council shall designate as affiliated societies are represented on the council and on the sectional committees as provided in articles 4 and 5.

These articles state the policy of the association as framed by the council in recent years. All the national scientific societies, including the great engineering societies and the American Medical Association, are now affiliated with the association and represented on its council. A Pacific Division has been formed which serves as a center for the scien-

tific societies and the scientific men of the Pacific Coast. A beginning has been made in the establishment of local branches and toward the affiliation of state and city academies.

At the Baltimore meeting of the association the committee on organization and membership, with the retiring president, Professor John M. Coulter, of the University of Chicago, as chairman, was instructed to take up these problems, and in the first instance more especially in the Central States, in view of the fact that the next two meetings will be held in St. Louis and Chicago.

Consideration should be given by men of science in the Central States to the desirability of forming a division to promote scientific work and scientific organization in that region. The association meets once in four years, successively in New York, Chicago and Washington. These are special convocation week meetings in which it is hoped that the scientific men and organizations of the whole country will take part, including those concerned with engineering, medicine, education, etc., and those devoted to the languages, history, economics, etc.

At the intervening two-year periods, the association will hold its meetings in large cities and these will also be large meetings. At the intervening alternate years the association plans to meet in smaller cities and university towns, and many of the affiliated societies will hold their meetings separately. It might be desirable on these alternate years to hold regional rather than national meetings, or it might be well for other divisions to follow the plan of the Pacific Division and hold meetings at some other time, as at Easter, at Thanksgiving or in the summer.

Apart from the formation of a Central Division the relations of the scientific academies and societies of the Central States to the national association deserve careful consideration. The American Medical Association is organized on the basis of state and county associations; the American Chemical Society has well-organized local branches; the National Education Association is at present considering similar plans.

The duplication of existing organizations should be avoided and the question arises whether the American Association could not enter into mutually helpful relations with the academies of science which are now doing useful work in the Central States and in some of the cities. The association is ready and anxious to arrange an affiliation which will leave the academy absolutely free and uncontrolled by it, but will allow the representation of the academy on the council which directs its activities and should be the body most influential in the organization, advancement and diffusion of science in America.

If all members of an affiliated academy become members of the association, part of the association membership fee of three dollars is returned to the academy for its expenses. Thus for $2.50 or $2.00 the member has the privileges—membership in the national association and subscription to the national weekly scientific journal—which in England cost $15. It is, however, not necessary for members of the local academy to become members of the association.

After an affiliation has been effected between the American Association, the national scientific societies and the state and city academies, it will be possible to coordinate with these the societies and clubs which exist in smaller centers and to established them where they are needed. An organization of this character is strictly scientific and democratic. The association has no control over the affiliated societies and academies, but becomes in effect an association of these societies, enabling them to cooperate in all directions where union is desirable.

The time is now particularly auspicious for scientific men to unite to obtain increased opportunities for their work. It is realized by all that science and the scientific men of the country were leading factors in bringing the war to a quick and favorable conclusion. The applications of science have enabled the country to amass the immense wealth which

could be devoted to the purposes of the nation; our scientific men were able to meet on terms of equal performance those of every other nation. In like manner it is agreed that science and scientific workers have a great part to play in the reconstruction period on which we are entering. The whole future of the nation rests on the proper development and distribution of our resources in natural wealth and in men. We must now decide to lead in scientific research and in the applications of science for the welfare of the people of the country.

This requires education and organization. Every scientific worker and all those who appreciate the fundamental place of science in national welfare should unite to do their part through our scientific organizations. They should be members, and active members, of the special society in their field, of their local society or academy, and of the American Association for the Advancement of Science, and these bodies should cooperate to advance their common interests.

The next meeting of the American Association and its affiliated societies will be held in St. Louis, beginning on December 29, 1919, to be followed by a meeting at Chicago a year later. The occasion should be taken to strengthen the association and its work in the central states, which have in recent years assumed such leadership in scientific research. It would be well if the meetings might be celebrated by the affiliation with the association of the strong state and city academies of the central states and the organization of a central branch of the association on the lines that have proved successful on the Pacific coast.

SCIENTIFIC EVENTS

THEODORE ROOSEVELT AND THE SOCIETY OF AMERICAN FORESTERS

Theodore Roosevelt was an honorary member of the Society of American Foresters. The following resolution was adopted as an expression of the esteem in which he was held by the members of the society:

In the death of Theodore Roosevelt, the Society of American Foresters mourns the loss of its greatest, most brilliant and most effective leader. The early growth of the profession of forestry in the United States was intimately bound up with his statesmanship while President. As a leader of the conservation movement he brought forcibly home to the American people the need of wise use and protection of the natural resources of this country. The crystallization of the conservation policy and the realization in large measure of forest conservation was one of the greatest achievements of his administration, and of profound significance in our progress toward national efficiency.

As a lover of nature and the out-of-doors, he was keenly interested in the forests, mountains, streams and wild life. As a traveler and explorer he expanded our knowledge of the forests of remote regions, both in Africa and in South America. By his proclamation, 148,000,000 acres of national forests were set aside—an amount three times the total proclaimed by all other Presidents since 1891, when the making of National Forest reservations began. It was in his administration and largely because of his advocacy that a true national forest policy was made possible by the transfer of the national forests from the Department of the Interior to the Department of Agriculture, in order that these forests might be placed under technical supervision. He realized the need of technical foresters in this country for the realization of this national forest policy, and therefore actively furthered forest education. He became an honorary member of the Society of American Foresters and, while President of the United States, addressed the society upon the ideals and duties of the American foresters. This address still remains to its members an inspiration of high purpose and of public service. As long as these ideals remain the guiding principle of the profession, the society will remain in the forefront of progressive thought and action in this country.

RESOLUTIONS IN MEMORY OF PRESIDENT VAN HISE

The following resolution in memory of the late President Charles R. Van Hise, of the University of Wisconsin, was unanimously voted by the Wisconsin Senate on January 8:

Whereas, President Van Hise was a Wisconsin man, born and reared on one of its farms, educated in its schools, and university, throughout his life a citizen of the state and devoting his energies to its service. He became a member of the University of

Wisconsin in 1875 and there continued until his death, forty-three years later, as student, teacher, investigator and president.

As student he won the highest honors of the university, and as teacher he made his department a power both in general education and in the production of professional geologists. Trained as a geologist in our university and in the study of problems offered by our state, his ability and insight earned for him the recognition of the scientific world of all nations for his masterly solution of the most difficult and fundamental problems of geology.

The characteristics which made him a great teacher, a great scholar and a great investigator, he continued to display to the full as president of the university. He had a singularly clear, noble and growing understanding of the duty of a state university to its commonwealth and he led the university far in the performance of that duty. He multiplied and strengthened the vital connections between university and state; not only developing and enriching its scholarship, but also carrying knowledge and light to all parts of the state and to all phases of its life. Thus the University of Wisconsin, under his guidance, became an example and a leader among the civic institutions of learning in the nation.

Dr. Van Hise contributed much to aid state and nation in questions of public policy arising from conservation, the control of industry and the newer development of international relations. To them he brought the same power to analyze problems and to present their solution which marked his work a science. Now, therefore, be it

Resolved by the senate, the assembly concurring, That the legislature of the state of Wisconsin expresses its grief in the death of President Charles Richard Van Hise and records its gratitude for his distinguished service rendered to the state through many years. With grief for the untimely death, with profound regret for the irreparable loss, the legislature expresses Wisconsin's just pride in her son and records the inspiring story of his public services and the noble devotion of his life.

AN INTER-ALLIED FELLOWSHIP OF MEDICINE

WE learn from the *British Medical Journal* that Sir W. Arbuthnot Lane presided over a meeting at the house of the Royal Society of Medicine on December 4 to consider further the desirability of forming an association for cooperation in medicine among the English-speaking countries, but not limited to them. Among those present were Major J. H. Means (U. S. A.), Lieutenant-Colonel Castellani (Italy), and Professor Weinberg (Paris). The acting honorary secretaries appointed at a previous meeting were Sir St. Clair Thomson and Mr. J. Y. W. MacAlister. The latter submitted a report in which he said:

The present movement was originated at a largely attended meeting held by invitation at Lord Eustace Percy's house, at which he urged that the opportunity presented by the coming together of medical men from America and all parts of the British Dominions should be utilized to organize some form of permanent organization which would result in a closer union between the English-speaking peoples through the medium of the medical profession. The proposal was warmly endorsed by those present, and Sir St. Clair Thomson and myself were asked to act as honorary secretaries and to endeavor to formulate a definite scheme and take the necessary steps for carrying it into effect.

I am afraid we have been able to do very little beyond sowing seed. A circular setting out our aims was prepared by Sir St. Clair Thomson, and circulated, in the first place, to the chiefs of the medical forces of this country, of the Dominions and of America, and from these very cordial expressions of approval and promises of support were obtained. The circular, backed by the opinions of those to whom we had first appealed, was then issued to a wider public, and many very gratifying and encouraging letters have been received. But practical progress depended as usual on the all-important question of finance, and in that direction we have no success to report. We had asked for and been promised an interview with the Prime Minister and Mr. Bonar Law in the hope of persuading the government to make a grant, but (one dare not say "unfortunately") the armistice intervened, and since then it would have been futile, if not impertinent, to trouble the Prime Minister with our affairs, and so, as far as finance is concerned, we have no progress to report. We have received letters which encourage us to believe that if a definite and approved scheme is prepared we may be able to get financial help from private persons.

After some discussion, in which the chairman, Sir Walter Fletcher, Sir St. Clair Thomson, Colonel Stock, Colonel Heald, Major Means, Colonel Castellani, Colonel Weinberg, Dr. Sorapure, Mr. MacAlister and others took

part, it was unanimously resolved to constitute the proposed organization with the object of drawing together the members of the medical profession in the inter-allied countries with a view to promoting intercourse and cooperation for the promotion of medical science and public health.

A general committee was nominated, and Sir Arbuthnot Lane was appointed honorary treasurer, and Sir St. Clair Thomson, Mr. Douglas Harmer and Mr. J. Y. W. MacAlister honorary secretaries (*pro tem.*).

THE PRODUCTION OF QUICKSILVER IN 1918

The domestic output of quicksilver in 1918, according to statistics compiled by F. L. Ransome, of the United States Geological Survey, Department of the Interior, was 33,432 flasks of 75 pounds each, valued at the average quoted market price at San Francisco ($117.92 a flask) at about $3,942,301. Compared with the output of 1917 of 36,159 flasks, valued at $3,808,266, this shows a decrease in quantity of 2,727 flasks but an increase in value of $134,035.

The productive states were California, Texas, Nevada, Oregon and Idaho, named in the order of decreasing importance.

The production of California was 23,231 flasks, against 23,938 flasks in 1917, a decrease of 707 flasks. As usual of late years, the New Idria mine, with which is included the San Carlos mine, yielded nearly half of the total output of the state. Only one other mine in the state, the New Almaden (including the El Senador mine), produced over 2,000 flasks in 1918. New Almaden has produced to date about 1,124,100 flasks and in 1865 alone produced 48,138 flasks from ore that yielded 11.3 per cent. of quicksilver. In total production New Idria, with 315,434 flasks to the end of 1918, ranks second, and Oat Hill (Napa Consolidated), with about 140,000 flasks, comes third. Sulphur Bank nearly trebled its output of the previous year and probably would have made still larger gains were it not for the fact that the high sulphur content of the ore renders furnace treatment and condensation difficult.

In general, quicksilver mining in California maintained fairly well during the year the revival of activity due to the war, as indicated by comparison of the output (33,432 flasks) with the production of 11,303 flasks in 1914. A large number of mines that were formerly productive have remained idle, however, and with the gradual return to normal conditions other mines are likely to revert to this class.

The output of quicksilver in Texas was 8,475 flasks, against 10,791 flasks in 1917. The Ellis mine, near McKinney Springs, considerably increased its output, and the Mariposa mine also made a small gain. The output of the Chisos mine, however, declined, and that of the Big Bend showed a still larger falling off. The Big Bend has been nearly exhausted down to the level of the underground water, so that pumping and additional development will be necessary if any considerable output is to be maintained. Prospecting has been continued by the Rainbow Mining Co., on the westward continuation of the Chisos ore zone, and some ore is reported to have been found.

SCIENTIFIC NOTES AND NEWS

Dr. William N. Logan, professor of economic geology in Indiana University, was appointed state geologist by Governor Goodrich on January 1.

Professor Nellis B. Foster, now lieutenant-colonel in the Medical Corps of the United States Army, has presented his resignation as professor of medicine and dean of the school of medicine of the University of Michigan, as he expects to be detailed to the military service for an indefinite period.

Dr. A. Hoyt Taylor, professor of physics at the University of North Dakota, now a lieutenant commander in the Navy, has resigned after a year's leave of absence and will continue his work at the Bureau of Standards on naval radio communication.

Major Lawrence Martin, general staff, U. S. Army, on leave of absence as associate professor of physiography and geography in the

University of Wisconsin, who is chief, Geographical Section, Military Intelligence Division, General Staff, was sent abroad last July as military observer in France and Italy and served at the front with American, British, French and Italian troops. He is now on duty in Paris with the American Commission to Negotiate Peace.

E. B. BABCOCK, professor of genetics in the college of agriculture, University of California, has gone to France under the auspices of the United War Work Council of the Y. M. C. A. to help carry out the program for the vocational education of American soldiers.

DANIEL H. OTIS, assistant dean of agriculture in the University of Wisconsin, has received from the government an appointment as farm management specialist in France.

DR. J. F. ABBOTT, professor of zoology at Washington University, has been appointed commercial attaché to the American Embassy at Tokyo and will leave for Japan in February.

PROFESSOR J. C. MERRIAM, of the National Research Council, returned to his work in paleontology at the University of California after attending the Baltimore meetings.

PROFESSOR DAVID MORRILL FOLSOM has resigned from the chair of mining at Stanford University.

PROFESSOR JOJI SAKURAI, director of the newly established Institute of Physical and Chemical Research in Tokyo, Japan, has been visiting scientific institutions in the United States.

MR. DAVID BRUCE, of London, has been elected a corresponding member of the Paris Academy of Sciences in the section of medicine and surgery.

MAJOR F. E. BREITHUT, Chemical Welfare Service, has been detailed by the War Department to the War Trade Board to act as chairman of the chemical group of the price section. Associated with Major Breithut will be: Mr. F. W. Cassebeer, Captain P. W. Carleton, Lieutenant Chas. L. Fry, Lieutenant W. N. Jones, Dr. H. L. Lewenberg, Captain W. Lee Lewis, Dr. W. B. Meldrum, Captain H. L. Trumbull. This group of workers is engaged in a study of price fluctuation of chemicals during the war and an analysis of its cause and consequence.

FAYETTE S. CURTIS, chief engineer of the New York, New Haven & Hartford Railroad, was elected president of the American Society of Civil Engineers for the year 1919 at the sixty-sixth annual meeting, which opened in New York City on January 15. The other officers of the society elected are: Herbert S. Crocker, Denver, Col., and Leonard Metcalf, Boston, Mass., vice-president; Arthur S. Tuttle New York, treasurer; George H. Clarke and Jacob S. Langthorn, New York; Charles C. Elwell, New Haven, Conn.; Willard Beahan, Cleveland, O.; John W. Alvord, Chicago, Ill., and Carl E. Grunsky, San Francisco, Cal., directors.

AT the annual meeting of the Brooklyn Entomological Society held on January 16, the following officers were elected for 1919: *President,* Mr. W. T. Bather; *Vice-president,* Mr. W. T. Davis; *Treasurer,* Mr. C. E. Olsen; *Recording Secretary,* Dr. J. Bequaert; *Corresponding Secretary,* Mr. J. R. de la Torre Bueno; *Librarian,* Mr. A. C. Weeks; *Curator,* Mr. George Frank; *Publication Committee,* Messrs. J. R. de la Torre Bueno, Chas. Schaeffer and George P. Engelhardt.

PROFESSOR WILLIAM J. HALE, of the department of chemistry, of the University of Michigan, tendered his resignation to the regents at the December meeting of the board. Professor Hale has accepted a position with the Dow Chemical Company, at Midland, Mich., and will devote his entire time to research work.

DR. S. L. GALPIN, who for several years has been a member of the department of geology and mining engineering at Iowa State College is now engaged in development work in the oil fields of Oklahoma, Kansas and Texas.

MR. HENRY HINDS has resigned from the Geological Survey to enter the employ of the Sinclair Oil and Gas Company, at Tulsa, Oklahoma.

D. D. BEROLZHEIMER, formerly librarian of the American Chemical Society, and of The Chemists' Club, is now assistant technical

editor with The Chemical Catalogue Company, New York.

Announcement is made at the Smithsonian Institution of the appointment of Neil M. Judd of the department of anthropology as curator of American archeology, United States National Museum. Mr. Judd has been a member of the scientific staff of the Smithsonian Institution for eight years. He returned to Washington on January 1, after eleven months' service in the aviation section of the army.

In January Professor H. Austin Aikins, of Western Reserve University, gave two lectures at the Carnegie Institute of Technology, Pittsburgh, before the occupational therapy class on problems of psychotherapy and the work in Canadian hospitals of importance for occupational aids. Lieutenant Colonel E. K. Strong spoke on job analysis in the army before the Research Bureau for Retail Training at the Carnegie Institute of Technology on January 22.

Rolla C. Carpenter, professor of experimental engineering at Cornell University since 1890, died at his home on January 19. Professor Carpenter, who was born in Orion, Mich., 1852, had active charge of many large engineering projects, and was the author of important works on engineering.

The death from influenza is announced of Edwin Henry Ingersoll, chemist in the Bureau of Animal Industry, U. S. Department of Agriculture.

Professor R. Nietzki, professor of chemistry at Bâle, known for his work on the chemistry of dyestuffs, has died at the age of seventy-one years.

At a meeting of the bureau chiefs and other high officials of the U. S. Department of Agriculture, December 11, 1918, held to take action on the death of L. W. Page, Dr. L. O. Howard said: "During the forty years of my daily association with the workers of the department, I have seen many changes. Many men of different types have been here. Many have come and many have gone. Some of the best of us are still here. Some of the very best of us have gone—some to other fields of work, some to the Unknown. Among them all I think that Logan Waller Page, looking at his individuality as a whole, was unique. Absolutely unspoiled by his wealth, his culture, his family connections, his social position, gaining from his Harvard education all that was good and nothing that was bad; frank, straight forward, honest, despising sham and pretense, hating graft, highly trained, idealistic in a way but with a clear, cool brain, full of great plans and with the ability to make them practical; unselfish, working intensely for the good of the whole country, dedicating to the good of all ideas which might have been turned to his own personal profit, a wonderful mixer, meeting every man on his own level, a marvellous teller of apt anecdotes; a citizen of the world and the highest type of good American—no other single one of us has approached him and I am sure that no one of us will ever meet just his like again."

In the article by Willard J. Fisher, entitled "The Balance, the Steelyard and the Concept of Force," in Science for November 1, 1918, "the words animism and animists, wherever used, should be replaced by "animatism" and "animatists." For the distinction between these reference may be made to the Encyclopædia Britannica, from which the definition in the article was drawn."

The secretary general of the Nineteenth International Congress of Americanists has on inquiry received information from the Brazilian Embassy at Washington regarding the coming session of the Americanists at Rio De Janeiro, to the effect that, according to a cable received from the Foreign Office of Brazil, the Twentieth International Congress of Americanists will be held from the eighteenth to the thirtieth of June, 1919. In view of the above decision, and in consideration of the importance from many standpoints of the congress in Brazil, it seems advisable that due steps be taken without delay by the Americanists in this country and Canada for a good representation.

IT is stated in *Nature* that the annual meeting of the Association of Public School Science Masters was held at the London Day Training College on December 31, 1918, and January 1, 1919, under the presidency of Sir Ronald Ross. The subject of the president's address was "Observations on the results of our system of education." A lecture on poison-gas warfare was given by Lieutenant-Colonel Smithells. There were discussions on the importance of restricting specialization in university scholarship examinations and giving weight to general education, opened by Mr. F. S. Young; science in the general education of boys, opened by Mr. W. D. Eggar and Mr. C. V. G. Civil; and courses in general science for classical Sixth Forms, opened by the Rev. S. A. McDowall.

UNIVERSITY AND EDUCATIONAL NEWS

GIFTS aggregating $128,000 to Yale University were announced on January 23. They include $25,000 to the Forestry School from Mr. and Mrs. Gifford Pinchot.

THE zoology department of Wabash College, of which Professor A. Richards has charge, has received from the estate of Professor Donaldson Bodine, formerly professor of zoology the sum of $5,000, to provide for the purchase of books for the zoology department, subject to an annuity.

AT the request of Professor Bailey Willis, professor of geology at Stanford University, who is continuing his war work with the House Commission in New York, Professor James Perrin Smith will act as executive head of the department of geology and mining for the coming year. Dr. Eliot Blackwelder, of the University of Illinois, has been appointed acting professor of geology during the winter quarter.

MR. H. P. STUCKEY, for the past ten years horticulturist at the Georgia Experiment Station, has been appointed director, to succeed J. D. Price, who resigned to accept the position on the Railroad Commission to which he was elected. Other changes in the station staff are the appointment of Mr. T. E. Keitt, formerly chemist of the South Carolina Station, as chemist the appointment of Mr. H. E. Shiver, formerly assistant in chemistry at the South Carolina Station as assistant chemist; the appointment of J. A. McClintock, formerly extension pathologist for Georgia, as plant pathologist and botanist, and the resignation of Mr. J. C. Temple, bacteriologist.

DR. N. L. BOWEN, of the Geophysical Laboratory, Carnegie Institution, has been appointed to the professorship of mineralogy at Queen's University, Kingston, Ontario.

DISCUSSION AND CORRESPONDENCE

AN UNCOMMON ICE FORMATION

WHILE skating on the upper part of the Charles River at North Bellingham, Mass., January 13, 1918, during a severe cold spell, we encountered an ice formation of a kind wholly new to us, though we have practised river skating for many years and are both fairly observant of natural phenomena. There is a low dam here over which a good head of water was flowing. Just below the dam an uneven bridge of ice resting partly on rocks and partly on the water formed a hood over the stream, and out of this rose a considerable number of upright columns of ice superficially somewhat resembling stalagmites. They were of pretty uniform diameter, about four or five inches, and varied in height from two or three inches to as many feet, while the tallest was perhaps three and a half feet. This tallest one and a number of the others were completed, being finished off with a tapering cap of snow-like structure that curved over towards the dam and into the wind, which was blowing pretty strongly down stream. Many, however, in process of formation showed how they were made.

They were all tubular and were built up from the inside by the bursting of bubbles that rose through the tubes and the freezing of the resulting spray. It was evident that the rush of water over the dam carried air with it under the hood of ice below, and that this air found vent here and there in the form of bubbles, which, bursting, gradually built up these vertical columns. Each unfinished, or live, column showed a crown of bursting

bubbles. The formation of the caps that finished off the completed, or dead, columns is, perhaps, to be explained in this way: When the column rose to a point where the wind reached it above the lee of the dam, the spray from the bursting bubbles would lodge chiefly on the leeward, or downstream, side of the orifice and in freezing would build up that side faster than the upstream side. The top would thus curve over upstream, the freezing spray building not only upwards but back against the wind, just as the hoar-frost or frozen mist of mountain-tops builds against a high wind. This would, of course, close the orifice in time and put a stop to the growth of the column.

It is not entirely clear how the bubbles rise to so considerable a height in the tubes—whether they are forced up by the rush of water over the dam and under the hood of ice, or whether it is because the air they contain is heated by the water to a higher temperature than the surrounding air. On this point, as on the whole subject, we should be very glad to get the opinions and observations of any one else who has seen this formation. Inquiry among friends has failed as yet to bring to light any similar observations on the part of others, and we find no mention of this phenomenon in the fourteen volumes of Thoreau's "Journal," observant as he was of the forms taken by ice, snow and frost along the Concord River and its tributaries. This has made our observation seem worth recording, though we can not doubt that under similar circumstances it might be repeated any cold winter.

Frederick A. Lovejoy,
Francis H. Allen
West Roxbury, Mass.

CELLULOID LANTERN SLIDES

To the Editor of Science: In a recent letter to Science regarding celluloid lantern slides, Mr. A. W. Gray states that "tracing cloth and waxed paper are usable; although their limited transparency produces a rather dark field, and the texture of the material shows plainly." The writer experimented some time ago with substitutes for glass lantern slides, giving special attention to slides which could be prepared quickly for temporary use.

I found that a satisfactory slide could be made by drawing figures or diagrams on thin white paper with india or colored ink. After the ink had become thoroughly dry both sides of the paper were brushed over with a light-colored penetrating oil. The thin glazed white paper used for duplicating typewritten letters serves admirably for the paper and a light neatsfoot makes a satisfactory oil. These paper slides may be inserted in cardboard holders and with suitable projecting apparatus the results are all that could be desired.

The effect of the oil is to increase greatly the transparency of the paper and when new the texture of the paper is quite imperceptible. Figures of lesser sharpness can be made with a fountain pen or even with a pencil. Diagrams and pictures of appropriate size may be cut from magazines or bulletins and treated with oil as outlined above. These are more satisfactory, of course, if no printing appears on the back, but for temporary use the printing in many cases will not destroy the usefulness of a diagram.

I have also made good slides in the same manner by treating $3\frac{1}{4} \times 4\frac{1}{4}$ photographic prints with oil. The projected pictures, while less bright than those procured with glass plates, present a softer effect and are especially interesting in the case of portraits. Since the usual photographic paper is quite heavy the lantern must be placed nearer the screen but if thinner paper could be obtained the results would be quite satisfactory if the usual distance were maintained.

Ralph G. Hudson
Department of Physics,
Kenyon College

HOLDING LARGE SPECIMENS FOR DISSECTION

In the zoological laboratory there are many things which are valuable aids in time and convenience. In dissecting large specimens it is often necessary to have some method of holding parts of the anatomy away so as to allow freer rein to one's actions, or of holding

the specimens open firmly. This may be done by using trays of galvanized iron with four or more loops of metal soldered on the sides to which ordinary heavy rubber bands are attached. To these rubber bands are tied small fishhooks which have had their barbs filed off. These hooks are to be fastened to any part of the anatomy so as to hold the specimen firmly, or to pull certain parts to the desired position. If a plain tray without the side loops is used, the rubber bands may be fastened to the ends of strong strips of cloth. The cloth is placed under the tray, one piece at the top and the other at the bottom, and if the strips are of the proper length, the rubber bands and hooks will be in relatively the same position as when they are fastened to rings along the edge of the pans. Removing the barb allows the hook to be withdrawn at any time without injuring the specimen. Care should be used not to stick the hooks in the hand, for owing to the strength of the rubber bands, the hook would make an ugly wound should it slip.

The advantages of this method are the saving of time and the lack of trouble, for we have a self-adjusting holder, as the rubber band allows for any change to be made in the position of the specimen or any of its parts. As compared to the old methods, it neither incurs the expense and the time of adjusting, as is the case with chains and hooks, nor the unreliability and unsteadiness as in the case where string and bent pins are used for this purpose.

JOHN M. LONG
WASHBURN COLLEGE

SCIENTIFIC BOOKS

Papers from the Department of Marine Biology of the Carnegie Institution of Washington. Vol. 9, pp. iii + 362, 105 pls., 14 figs., 1918.

In this handsome and very important volume there is a great deal of information that is of the highest value to the biologist, geologist, paleontologist and oceanographer. In fact, there is so much of value that this notice can mention but a few of the results that are most interesting to the reviewer. There are eleven papers, of which the largest is by T. W. Vaughan on "Some Shoal- water Corals from Murray Island (Australia), Cocos-Keeling Islands, and Fanning Island" (185 pp. and 73 pls.). The other authors are Alfred G. Mayer, M. I. Goldman, Albert Mann, Joseph A. Cushman, M. A. Howe, R. B. Dole and A. A. Chambers, R. C. Wells and L. R. Cary.

The shoal-water corals of the Great Barrier Reef of Australia described by Vaughan in the systematic part of his paper, amount to 149 forms and 38 genera, 1 genus and 15 species being new. Certain species range from the east coast of Africa on the west to the Hawaiian and Fanning islands on the east. Great pains have been taken not only to determine the proper names, but to give ecologic conditions as well. The illustrations are the finest we have ever seen of the skeleton of corals, and as the photographs are not retouched, the heliotypes look as natural as the corals themselves. Many of Dana's types are figured.

The ecology of the Murray Island corals near the northern end of the Great Barrier Reef is described at length in the first paper by Mayer, which is a very important one.

More than forty species were studied, with a view to determine the factors of their distribution. These factors, in the order of their importance, are: temperature, silt, the effects of moving water, and the struggle for existence between the species. All corals appear to be wholly carnivorous. Whenever the water is agitated, cool and free from silt, the reef-flat is wide and covered with an abundance of living corals, but where the water is calm, hot and depositing silt faster than the corals can remove it from themselves, the reef-flat is narrow and the corals deficient. Much silt kills corals in about two days. In a square 50 feet on a side, there occurred two living corals from 375 to 425 feet from shore, while in the same area, at from 1,400 to 1,500 feet out from land, there were 1,833 heads. Four genera constitute 91 per cent. of the corals present.

In regard to annual rate of growth among the stony corals there are some interesting facts. Some of the identical coral heads of

Thursday Island measured and photographed by Saville-Kent were remeasured by Mayer twenty-three years later. These results show that large coral heads may increase as much as two inches in diameter per year, while some kinds do not grow beyond a certain specific size. The average annual growth appears to be about one inch, though in the Floridian reefs the rate of increase is less.

Mayer states that stream waters pouring outward from forested volcanic shores are alkaline and thus can not dissolve limestone by reason of their "acidity." Thus the Murray-Agassiz solution theory of the formation of atolls is not supported. Holothurians are a potent factor in dissolving the materials that go to make reef limestones, which they swallow, and the effects of currents in scouring are important factors tending to convert fringing reefs into barrier reefs.

The problem of the precipitation of $CaCO_3$ in the ocean and the possibility of its solution there is discussed in the light of the latest evidence, and the conclusion is reached that in the shoal waters of the tropics, ocean-water does not dissolve calcium carbonate, but that the contrary process—precipitation by both inorganic and organic (bacterial) agencies—is taking place. Conditions in the deep sea, and perhaps in the cold waters of high latitudes, are different.

In the Murray Island reef sediments, Vaughan states that the dominant rock makers are (1) corals (34 to 42 per cent.); (2) coralline algæ (32 to 42 per cent.); (3) molluscs (10 to 15 per cent.); foraminifers (4 to 12 per cent.) and alcyonarians. Other marine animals are unimportant in their skeletal additions.

Cary shows that, in the Tortugas area, the gorgonians are also very important reef builders and therefore great rock contributors, since nearly 20 to 36 per cent. of their bodies consists of calcareous spicules. As almost all of these colonies die a violent death, and on the average all those living within 30 feet of water are replaced in five years by other colonies, he calculates that at least one ton of spicules or limestone is added per year to each acre of reef ground. In fact, when the gorgonians are common, they are more important as limestone makers than are even the stony corals.

Charles Schuchert

SPECIAL ARTICLES

A METHOD OF DEMONSTRATING THE DIFFERENCE-TONES

If a Rayleigh inductometer bridge be connected up, and a telephone receiver A be in series with the alternating e.m.f., the demonstration of the difference-tone is an exceedingly simple matter. Let the bridge be balanced for a high frequency F', say about 2,500; this tone will therefore not reach the ears if the balancing receivers be of the double, head-strap variety. Now whistle a scale into the receiver A. Since the bridge is not balanced for the new frequency, the whistle "gets through" into the balancing receivers. But one also hears another tone which slides down as the whistle slides up the scale. If between the balancing receiver and the bridge a good amplifier be connected, then the balancing receiver may be a "loud-speaking receiver" (such as are now used for announcing trains in large stations, etc.) and the apparatus is suitable for class demonstration. The great advantage of this arrangement is that we are not confined to any two fundamentals, as in the case of forks.

The phenomenon is unquestionably slightly complicated by the action of one alternator on the other, but I had not the time to see to what extent the extra tone differs from $F'-F''$.

The writer offers the above as a lecture experiment in physics and psychology, being under the impression that it has not been reported before.

Paul F. Gaehr
Wells College,
Aurora, N. Y.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

REPORT OF THE TREASURER FOR 1918

In conformity with Article 15 of the constitution and by direction of the council, the treasurer has the honor to submit the following report for the period December 15, 1917, to December 16, 1918, both inclusive.

The total of cash receipts during the year is $7,747.27. Disbursements made in accordance with directions of the council amounted to $7,786.00. These include $4,000 for purchase of a like amount of United States Third and Fourth Liberty Loan Bonds of 1918 for the association and held as an investment.

The total amount of funds of the association consisting of cash, cost value of securities purchased, and appraised value of securities received from the Colburn estate is $116,605.45.

A detailed statement is appended.

ROBERT S. WOODWARD,
Treasurer

December 23, 1918

BALANCE SHEET

Assets

Investments:		
Securities (Exhibit A)		$112,777.50
Cash in banks		3,827.95
		$116,605.45

Liabilities

Funds:		
Life memberships, 343 at $50		$ 17,150.00
Jane M. Smith Fund		5,000.00
Colburn Fund		77,755.74
		99,905.74
Unexpended balance		16,699.71
		$116,605.45

CASH STATEMENT

Receipts

1917		
Dec. 15. Balance from last report		$ 3,866.68
Interest from securities	$5,254.80	
Interest from bank balance	92.47	
48 life commutations	2,400.00	$ 7,747.27
		$11,613.95

Disbursements

Investments:		
$2,000 U. S. Third Liberty Loan of 1918	$2,000.00	
$2,000 U. S. Fourth Liberty Loan of 1918	2,000.00	$ 4,000.00
Grants:		
William Tyler Olcott	$ 300.00	
A. E. Douglass	250.00	
Carl Eigenmann	500.00	
Edwin B. Frost	500.00	
R. A. Porter	200.00	
E. W. Sinnott	200.00	
O. F. Stafford	500.00	
Herman L. Fairchild	200.00	
S. D. Townley	250.00	$ 2,900.00
Interest on Life Memberships:		
4 members (Jane M. Smith Fund)	$ 200.00	
343 members ($17,150 at 4 per cent.)	686.00	$ 886.00
		$ 7,786.00
Cash in Banks:		
Fifth Avenue Bank of New York	$1,722.69	
U. S. Trust Company of New York	2,105.26	$ 3,827.95
		$11,613.95

(*Exhibit "A"*)

SCHEDULES OF SECURITIES

Securities Purchased

Par Value		Purchase Value
$10,000	Chicago and Northwestern Railway Co. general mortgage 4 per cent. bonds, due 1987	$ 9,425.00
10,000	Atchison, Topeka and Santa Fe Railway Co. general mortgage 4 per cent. bonds, due 1995	9,287.50
10,000	Great Northern Railway Co. first and refunding mortgage 4.25 per cent. bonds, due 1961	10,050.00
10,000	Pennsylvania Railroad Co. consolidated mortgage 4.5 per cent. bonds, due 1960	10,487.50
10,000	Chicago, Burlington and Quincy Railroad Co. general mortgage 4 per cent. bond, due 1958	9,350.00
10,000	Union Pacific Railroad Co. first mortgage 4 per cent. bonds, due 2008	9,012.50
10,000	Northern Pacific Railway Co. prior lien railway and land grant 4 per cent. bonds, due 1997	9,187.50
10,000	New York Central and Hudson River Railroad Co. 3.5 per cent. bonds, due 1997	8,237.50
8,000	U. S. Second Liberty Loan Bonds	8,000.00
2,000	U. S. Third Liberty Loan Bonds	2,000.00
2,000	U. S. Fourth Liberty Loan Bonds	2,000.00
		$ 87.037.50

Bonds from Colburn Estate

Par Value		Appraised Value
$20,000	Acker, Merrall and Condit Co. debenture 6 per cent. bonds	$13,600.00
7,000	Buffalo City Gas Co. first mortgage 5 per cent. bonds	1,540.00
8,000	Park and Tilford Co. sinking fund debenture 6 per cent. bonds.	6,400.00

42,000 Pittsburgh, Shawmut and Northern Railroad first mortgage 4 per cent. bonds, due February 1, 1952.....	4,200.00	$ 25,740.00
$169,000		$112,777.50

I certify that I have audited the accounts of the treasurer of the American Association for the Advancement of Science for the period December 15, 1917, to December 16, 1918; that the securities representing the investments of the association have been exhibited and verified; and that the income therefrom has been duly accounted for.

The financial statements accompanying the treasurer's report are in accord with the books of the association and correctly summarize the accounts thereof.

Herbert A. Gill,
Auditor

Dated December 23, 1918

L. O. Howard, permanent secretary, in account with the American Association for the Advancement of Science

From November 1, 1917, to October 31, 1918

Dr.

To balance from last account.....		$ 6,739.26
To receipts from menbers:		
Annual dues, 1918.....	$32,809.00	
Annual dues, 1919.....	208.00	
Annual dues, previous yrs.	312.00	
Admission fees	715.00	
Associate fees	6.00	
Life membership fees....	1,247.00	$35,297.00
To other receipts:		
Sale of publications	47.50	
Miscellaneous receipts including treasurer's payment of Science subscriptions for life members, interest, foreign postage, sale of programs, etc.	1,700.73	$ 1,748.23
		$43,784.49

Cr.

By publications:		
Publishers Science	$23,007.48	
Preliminary announcement, circulars, forms, etc.	1,222.50	$24,229.98
By expenses Pittsburgh meeting:		
Sectional secretaries' commutations, accounts, etc.		896.98
By expenses Pacific Division.		950.00
By expenses Washington office:		
Salary, permanent sec'y...	$ 1,500.00	
Salary, assistant sec'y....	2,000.00	
Extra clerical help.....	1,916.60	
Postage	1,266.24	
Express, telephone and telegrams	91.79	
Office equipment	375.30	
Stationery and forms....	556.15	$ 7,706.08
By miscellaneous expenses:		
To treasurer, life membership fees	$ 2,400.00	
To overpaid dues returned.	26.00	$ 2,426.00
		$36,209.04
By balance to new account..		7,575.45
		$43,784.49

The foregoing account has been examined and found correct, the expenditures being supported by proper vouchers. The balance of $7,575.45 is with the following Washington, D. C. banks:

American Security & Trust Co.....	$2,327.27
American National Bank of Washington.	3,243.28
American National Bank of Washington (Savings Department)	2,004.90
	$7,575.45

Herbert A. Gill,
Auditor

Washington, D. C.
December 18, 1918

SECTION E—GEOLOGY AND GEOGRAPHY

Section E of the American Association for the Advancement of Science met this year in conjunction with the Geological Society of America and the Association of American Geographers in the Civil Engineering building of Johns Hopkins University, Baltimore, on December 27 and 28. Following the present agreement whereby the affiliated societies take charge of the program whenever they meet jointly with Section E, the section had no program of its own. The address of the retiring vice-president, Professor George H. Perkins, of the University of Vermont, upon the subject, "Vermont physiography," was delivered on the evening of December 28 at the annual dinner of the Geological Society of America held in the Southern Hotel. It will be published in Science. The papers of the general sessions will appear in the *Bulletin* of the Geological Society of America, Vol. 30, and in the *Annals* of the Association of American Geographers, Vol. 9.

Dr. C. K. Leith, of the University of Wisconsin, was elected vice-president of the association and chairman of Section E for the coming year; Dr. H. A. Buehler, state geologist of Missouri, member of the council; Dr. W. W. Atwood, of Harvard University, member of the Sectional Committee for five years, and Frank W. DeWolf, state geologist of Illinois, member of the general committee.

Rollin T. Chamberlin,
Secretary

SECTION H—ANTHROPOLOGY AND PSYCHOLOGY

SECTION H, Anthropology and Psychology, of the American Association for the Advancement of Science, held three sessions at the Baltimore meeting December 26–28. The Thursday afternoon meeting was in conjunction with the American Anthropological Association at which there was an attendance of forty-five.

The Friday afternoon session was in conjunction with Section L and the American Psychological Association. The attendance was over one hundred and the Saturday morning session was in conjunction with the Psychological Association also, at which there was an even larger attendance.

At the regular business meeting the following were elected to office:

Vice-president and chairman of the Section—Professor R. M. Yerkes, University of Minnesota.

Member of Council—Professor J. B. Miner, Carnegie Institution of Technology.

Sectional Committee for 5 Years—Professor W. S. Hunter, University of Kansas.

Member of General Committee—Professor A. E. Jenks, University of Minnesota.

At the Thursday afternoon meeting, Colonel Fabio Frassetto, Royal Italian Embassy, presented a paper on the subject, "A unified blank of measurements to be used in recruiting in the allied countries. A plea for the unification of anthropological methods." Following the paper it was moved and carried that a committee of three anthropologists be appointed to consider the paper and recommend action. Chairman, Dr. Aleš Hrdlička announced later the following members of this special committee: Dr. Franz Boas, Dr. G. G. MacCurdy and Dr. Robert Bennett Bean.

At the Thursday meeting Professor J. C. Merriam outlined the present plans of the National Research Council for continuation of its organization. The following resolution was presented at that time and formally adopted at the business meeting of the Section, Friday afternoon: Resolved:

(*a*) That Section H heartily approves the plan of the National Research Council for bringing about a closer cooperation of related branches of science favoring research.

(*b*) That, however, it is the opinion of Section H that good results in this direction can only be expected if perfect autonomy and freedom of each branch of science represented is safeguarded in the proposed division.

(*c*) And that it is further the opinion of the Anthropologists of Section H here assembled that the direction of each division as proposed of the National Research Council should be vested, not in a single appointee, but in a board consisting of a representative of each branch of science embraced in the division, and these representatives shall be men whose selection is ratified by the principal associations and bodies of these branches of science.

Titles of papers presented at the three sessions are as follows:

THURSDAY, P.M.

Race in relation to disease: DR. FREDERICK L. HOFFMAN, Prudential Insurance Company.

A unified blank of measurements to be used in recruiting in the allied countries: A plea for the unification of anthropological methods: PROFESSOR FABIO FRASSETTO, Royal Italian Embassy.

The war museum and its place in the National Museum Group: PROFESSOR W. H. HOLMES, United States National Museum.

Post-bellum anthropological research in the United States: DR. J. W. FEWKES, Smithsonian Institution, Washington.

Race origin and history as factors in world politics: PROFESSOR J. C. MERRIAN, National Research Committee.

The effect of the war upon the American Child: RUTH MCINTIRE, National Child Labor Committee.

Anthropology and Americanization training: PROFESSOR A. E. JENKS, University of Minnesota.

Heights and weights of children under six; statistics secured by the Children's Bureau: DR. ROBERT M. WOODBURY, Children's Bureau, U. S. Department of Labor.

The war and the race: DR. A. HRDLIČKA, United States National Museum.

FRIDAY P.M.

Examinations of emotional fitness for warfare: PROFESSOR R. W. WOODWORTH, Columbia University.

Army trade tests: DR. BEARDSLEY RUML, Trade Test Division, War Department (Carnegie Institute of Technology).

Practical application of army trade tests: MAJOR J. W. HAYES, Trade Test Division, War Department (University of Chicago).

Army personnel work; Implications for education and industry: LIEUTENANT COLONEL W. V. BINGHAM, Personnel Branch, General Staff (Carnegie Institute of Technology).

Methods of mental testing used in the United States army: Major Lewis M. Terman, Division of Psychology, Surgeon General's Office (Stanford University).

Psychological service in army camps: Major George F. Arps, Division of Psychology, Surgeon General's Office (Ohio State University).

4:30 P.M.

Vice-presidential address: Scientific personnel work in the army: Professor E. L. Thorndike, Columbia University.

SATURDAY A.M.

The work of the Psychology Committee of the National Research Council and the Division of Psychology, Surgeon General's Office, during 1918: Major Robert M. Yerkes, Division of Psychology, Surgeon General's Office (University of Minnesota).

Results and values of psychological examining in the United States Army: Dr. Mabel R. Fernald, Division of Psychology, Surgeon General's Office (Laboratory of Social Hygiene).

The relation of intelligence to occupation as indicated by army data: Dr. James E. Bridges, Division of Psychology, Surgeon General's Office (Ohio State University).

Functions of psychology in rehabilitation of disabled soldiers: Major B. T. Baldwin, Division of Reconstruction, Surgeon General's Office (Iowa State University).

Official method of appointing and promoting officers in the army: Colonel W. D. Scott, Personnel Branch, General Staff (Director of Bureau of Salesmanship Research, Carnegie Institute of Technology).

Psychological investigations in aviation: Major Knight Dunlap, Lakeside Hospital, Cleveland, Ohio (Johns Hopkins University).

Speech reconstruction in soldiers: Professor W. B. Swift, Division of Medical Inspection and Physical Education, Cleveland Public Schools.

A program for mental engineering: Lieutenant Commander Raymond Dodge, Navy Department (Wesleyan University).

E. K. Strong, Jr.,
Secretary

THE SOCIETY OF AMERICAN FORESTERS

The annual meeting of the Society of American Foresters was held at Baltimore, December 27 and 28, in conjunction with the American Association for the Advancement of Science. The following papers were presented:

The effects of destructive lumbering on labor: Professor B. P. Kirkland.

The timber census in the northeastern states: Professor A. B. Recknagel.

Marketing of timber from farm woodlands: F. W. Besley.

The lumber industry and its relation to the war program: Professor R. C. Bryant.

Use of wood fuel as a war measure: W. D. Clark.

War lumbering in Scotland—some suggestions for American forest policy: E. C. Hirst.

Some future possibilities in the forest industries: Professor F. F. Moon.

The structure and value of Parana pine forests of Brazil: H. N. Whitford.

Forest formations in British Columbia: H. N. Whitford.

Forest research and war: E. H. Clapp.

Preliminary results of forest experiments in Pennsylvania: Professor J. S. Illick.

Some aspects of silvical investigations as an after-the-war activity: Clyde Leavitt.

Factors controlling the distribution of forest trees in Arizona: G. A. Pearson.

Gray birch and white pine reproduction: Professor J. W. Toumey.

Report of the war committee: Professor J. W. Toumey.

The officers of the society elected for 1919 are as follows:

President—F. E. Olmsted.
Vice-president—W. W. Ashe.
Secretary—Paul D. Kelleter.
Treasurer—A. F. Hawes.

Paul D. Kelleter,
Secretary

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